Communication Repair and Response Classes

Hedda Meadan and James W. Halle
University of Illinois at Urbana-Champaign

A communicative repair has been defined as the ability to persist in communication and to modify, repeat, or revise a signal when the initial communication attempt failed. From an operant perspective, initial communicative acts and communicative repairs can be considered members of a response class in which each response produces the same outcome. The purpose of this paper is to integrate concepts in the child language literature with those in behavior analysis by examining communicative repair in the context of response classes. Communication breakdowns and repair are described and the concept of response class as it relates to communication repair is explained. To illustrate the relationship between communication repair and response classes, data from a larger study that examined communicative repair are presented.
Keywords: communication breakdowns and repair; response class; child language.

One of the challenges of young children with communication disabilities is learning to communicate in effective ways. Their communication can mirror that of very young children before they acquire speech and language (e.g., reach for food or vocalize to gain attention). Listeners often misunderstand these alternative means and, therefore, providing children with strategies to repair misunderstandings is critical, if they are to effectively influence the behavior of others. In the child language literature a communicative repair is defined as the ability to persist in communication and to modify, repeat, or revise a signal when the initial communication attempt failed (Wetherby & Prizant, 1993).

Consider the following scenario:

> John, a 3-year-old boy with autism, was sitting at the table eating. Suddenly, he put his spoon down and reached with his hands across the table. "What?" his mother asked. John reached again toward a cup on the table that was out of his reach. His mother looked at him and asked "Do you want the water?" John pushed his mother's hand toward the cup and vocalized. His mother gave him the cup and he smiled and drank the water.

This short episode started with an *initial communication act*. It is suggested that John was communicating intentionally by reaching across the table to request the water. John's mother was unsure of John's request, thus a *communication breakdown* ensued. John then tried to *repair* his request by repeating his signal. His mother asked again, this time more specifically, for clarification, "Do you want the water?" (i.e., a second communication breakdown) and John persisted by pushing his mother's hand toward the cup and vocalizing (i.e., a second communication repair). At the end of the episode John received the cup of water and appeared happy and satisfied. John used different signals (e.g., reaching, vocalizing, pushing his mother's hand) to request the water (i.e., the reinforcer). A behavior analyst would refer to John's requests as mands. If each of these behaviors had been reinforced in the past by accessing desired objects, together they would constitute a *response class* and could be considered *functionally equivalent* because each member produced a common outcome or effect on the environment (i.e., access to a desired object).

The purpose of this paper is to integrate concepts in the child language literature with those in behavior analysis by describing communication repair in the context of response classes. A response class is a group of topographically different behaviors that produce the same effect on the environment (i.e., have the same consequence) (Carr, 1988). From an operant perspective, initial communicative acts and communicative repairs can be considered as members of a response class in which each response produces the same outcome. Learning to repair communication breakdowns is important because of the

limited and unconventional repertoires children with communication disabilities possess and the frequency with which misunderstandings or breakdowns occur (Keen, 2003; Wetherby, Alexander, & Prizant, 1998). In addition, repairing communication is an indicator that children are intentionally communicating and that they are responding to others' perspectives (Wetherby et al., 1998). We will define communication breakdowns and repair as they are described in the child language literature, provide an operant analysis of each, and explain the concept of response class as it relates to communicative repair. We also will discuss briefly the notion that problem behavior may be a communicative repair strategy. To illustrate the relationship between communicative repair and response classes, we will provide data from a larger study that examined communicative repair.

Communicative Repair and Communication Breakdowns

Figure 1 presents four potential components of a communicative exchange: (a) initial communication act, (b) communication breakdown, (c) communicative repair, and (d) outcome.

The exchange begins when one individual initiates an interaction with another individual. This initiation is typically followed by a response from the communication partner. The exchange may continue until one of the partners terminates the interaction. A *communication breakdown* is a disruption in the continuous flow of turn-taking that constitutes a conversation (Brady & Halle, 2002). A response by the initiator to a communication breakdown is called a *communicative repair* attempt.

Communication Breakdown

Researchers have examined repair in two contexts: (a) the natural occurrence of communication breakdowns (e.g., Golinkoff, 1986; Tomasello, Conti-Ramsden, & Ewert, 1990) and (b) the scripted occurrence of communication breakdowns (e.g., Brady, McLean, McLean, & Johnston, 1995; Brinton, Fujiki, Winkler, & Loeb, 1986; Halle, Carey, & Phillips, 1999). In the natural environment, communication breakdowns are frequent. Golinkoff (1986) found 62% of communication episodes between young typically developing children and their mothers were either negotiated or missed, only 38% were immediately successful. According to Golinkoff, communication breakdowns fall on a continuum which ranges from a "true failure to a feigned failure" (p.461). A communication partner might misunderstand the child's message, but also may feign a communication breakdown to encourage the child to produce a more sophisticated message. For example, a mother might feign a communication breakdown to evoke a verbal message instead of a gesture. It is likely that children with communication disabilities will encounter communication breakdowns more often than typically developing children (Keen, 2003) because their messages usually are less conventional and may be more difficult to understand. Researchers have described three main types of communication breakdowns: *Requests for Clarification*, *Ignore*, and *Wrong Response.*

In the scenario above, the mother used two *Requests for Clarification*, a nonspecific request (i.e., "What?") and a specific request (i.e., "Do you want the water?"). These requests are obvious indications that a breakdown in communication has occurred. Other examples of nonspecific requests are "Huh?", "I do not understand?" (Brinton & Fujiki, 1991; Brinton, et al., 1986), and "pardon" (Golinkoff, 1986).

Ignore (Brady et al., 1995) or *non-acknowledgment* (Tomasello et al., 1990) is another category of communication breakdown. For example, an Ignore breakdown would have occurred if the child in the scenario above were reaching for the cup of water and his mother did not respond to his signaling. Tomasello et al. (1990) described non-acknowledgment breakdown episodes as occurring when an adult gives no verbal or non-verbal acknowledgment of the child's message when one is seemingly called for.

Wrong Response (Brady et al., 1995), *misunderstanding* (Wilcox & Webster, 1980), or *topic shift* (Tomasello et al., 1990) occurs when a communication partner changes the topic of conversation in relation to the child's topic. For example, wrong-response breakdowns occur when children ask for help obtaining an object and their parent tries to re-direct the child to a different object (Brady & Halle, 2002) or when their parent interprets the request as a comment and tells them "Yes, I see it" (Wilcox & Webster, 1980) and the child does not obtain the item.

Communicative Repair

Following a communication breakdown, children might not respond, thereby ending the exchange, or they might attempt to repair their message. In the context of observations in the natural environment, researchers have found that children tend to use repair strategies more often than not responding when their message is misunderstood (Gallagher, 1977; Golinkoff, 1986). According to Alexander, Wetherby, and Prizant (1997), the acquisition of the ability to repair is a reflection of the development of three achievements: (1) the emergence of communication intentionality or the pre-planned and persistent production of a signal to impact a listener, (2) the development of the socio-emotional ability of perspective-taking that allows one to recognize a communication breakdown, and (3) the acquisition of a repertoire of effective and conventional preverbal and/or verbal communication means. Although researchers have used different terms and definitions to describe communication repair strategies, three main types of repair have been identified: *repetitions*, *modifications*, and *recasts*.

Repetition as a repair strategy occurs when the communicator produces the same message as produced in the original message (Brady et al., 1995; Gallagher, 1977; Paul & Cohen, 1984). Alexander (1994) defined a repetition of repair as "a persistent communication attempt to achieve the original goal of the reference act using exactly the same communication means as the reference act" (p.23). Repetition as a repair strategy is considered to be the most basic type (Brady & Halle, 2002).

Modifications include changes in the original message. Researchers have used two categories of modification: addition and reduction. *Addition* (Alexander, 1994; Brady et al., 1995; Brinton, et al., 1986) or *augmentation* (Golinkoff, 1986) as a repair strategy occurs when the communicator repairs the message by producing the same gestures, vocalization, or speech as in the original message and adding other communicative behavior. *Reduction* (Brady & Halle, 2002; Tomasello, Farrar, & Dines, 1984) or *simplification* as a repair strategy occurs when the communicator repairs the message by eliminating some topographies from the original message.

Recast (Brady et al., 1995) or *substitution* (Golinkoff, 1986) as a repair strategy occurs when the communicator produces a repair that does not include any of the same communication topographies that were used in the original communication act. Golinkoff (1986) reported that substitution was the only strategy that increased with development during the second year of life. Golinkoff concluded "substitutions are evidence that infants are utilizing their communicative repertoire more flexibly" (p. 470).

Operant Analysis of Breakdowns and Repairs

Breakdowns are the equivalent of mands that are not reinforced. The reasons for the lack of reinforcement vary as suggested in the section on breakdowns (e.g., misunderstood, ignored, re-directed). When previously reinforced responses, such as communicative requests, fail to produce reinforcement, an extinction episode occurs. We know that behavior undergoing extinction often is characterized by repetition, intensification, and topographic variability. These characteristics are identical to those in the child language literature that define various types of repairs (i.e., repetition, modification, recast).

Communication Repair and Response Classes

Response Classes

Carr (1988) defined response class as a "group of two or more topographically different behaviors, all of which have the same effect on the environment" (p.222). Producing the same effect on the environment means that the behaviors are all maintained by the same reinforcer. If two or more behaviors have the same effect on the environment, they can be perceived as *functionally equivalent* (Carr, 1988).

Baer (1981) described two classes of behavioral co-occurrence, negative and positive. The probability of occurrence of the members in each class varies either directly or inversely. In positive co-occurrence classes (e.g., imitation), the number of members of each class is virtually infinite and when the probability of one member in the class changes, other members' probability will change in the same direction. For example, when imitative hand-clapping is reinforced, the probability of other imitative responses (e.g., stomping foot, waving bye-bye) also is strengthened. In the case of negative co-occurrence classes (e.g., accessing desired items), when the probability of one member of the class changes, other members' probability will change in the opposite direction. Therefore if one response is extinguished, punished, or prevented, another emerges to serve the same function. Thus, if John's mother from the scenario above reinforces (i.e., delivers the cup of water) only vocalizations, the probability of other responses (e.g., reaching, pushing mother's hand) in the same context will decrease. Baer suggested that the responses in negative co-occurrence classes may be arranged in a hierarchy of substitution. The specific response emitted will be the most efficient one for that situation. Recently researchers have identified factors that affect the efficiency of a response: response effort, schedule of reinforcement, immediacy of reinforcement, quality of reinforcer (Horner & Day, 1991; Mace & Roberts, 1993) and history of punishment for the response (Halle & Drasgow, 2003).

In addition to the efficiency factors just mentioned, an additional one may determine the response option produced. This factor pertains to the physical and social context (i.e., contextual stimuli). For example, a child may learn to say "please" at home to optimize reinforcement, whereas the same child may have learned to scream at school because screaming optimizes reinforcement in that setting (Drasgow, Halle, & Phillips, 2001). This child has learned to discriminate cues in the environment. In this instance, a parent responds most readily to "please" and teachers respond most readily to screams. The child's mand topography has come under the control of specific adults. This phenomenon is referred to as *conditional discrimination.* The topography of the response is conditional on the listener. In general, the response that is most efficient in a specific context (e.g., social partner, physical proximity of desired item, listener attention) is the one most likely to be emitted (Drasgow et al., 2001; Reichle & Johnston, 1999; Sigafoos & Drasgow, 2001).

Response Classes, Repair, and Problem Behavior

From an operant perspective, repairs can be considered as members of a response class in which each response produces the same consequence or environmental outcome. As described in the first scenario, when John requested a cup of water, he used different topographies (e.g., reaching, vocalizing) to obtain the same reinforcer (e.g., water). If these responses have been reinforced in the past by accessing desired objects, they constitute a *response class*. Repairs represent a case of a negative co-occurrence response class (Baer, 1982) because when one response is strengthened, other members of the class are weakened (in the same context) (Brady & Halle, 2002). The topography of repair children will emit in a specific context is, therefore, influenced by their past experiences in that context (e.g., reinforcement and punishment variables, response effort required) and by specific contextual stimuli (e.g., communication partner identity and arrangement of the physical environment).

A number of researchers have identified problem behavior as a communicative repair strategy (Brady & Halle, 2002; Halle, Brady, & Drasgow, 2004; Keen, 2003; Wetherby et al., 1997). The parallel concepts of repair and behavior undergoing extinction provide a compelling model for the etiology of problem behavior. When previously reinforced, non-problematic mand topographies are not reinforced, then intensification or behavioral variability may emerge as repairs. Often these topographies are intrusive or coercive and thus are labeled problem behavior. Additionally due to their coerciveness, they may be more likely to produce the desired result because of their "demand" characteristics (Baer, 1982). Of course, this is a description of positive reinforcement of problem behavior.

A Case Study

To illustrate communicative repair and response classes, we will present findings from a larger study that examined the repairs of young children with substantial language delays. Ron, a 2-year 4-month old boy with autism, did not use any functional words; his receptive language age equivalency was 16 months and his expressive language age equivalency was 12 months on the Preschool Language Scale, 3rd edition (PLS-3, Zimmerman, Steiner, & Pond, 1992). Ron's parents and speech therapist reported that he requested items and activities using gestures (e.g., reaching and leading) and vocalizations, but his communication skills were inconsistent from day to day.

The purpose of the study was to describe how Ron initiated requests and how he repaired when his first attempt failed. The study was divided into two different conditions: natural and structured observations. To examine Ron's repair behavior in his natural environment we observed and videotaped Ron's everyday interactions with his parents (mainly his mother), once a week for 7 months. Each observation was 20-60 minutes long. One of Ron's favorite activities was book reading. The data presented below include only requests and repairs during book reading. The findings are descriptive and are illustrative of the concepts of repair and response classes. Ron's parents read him stories throughout the day and intentionally capitalized on his interest in books and hearing stories to enhance his communication and shape his requesting topographies. For example, Ron's parents placed his favorite books on the highest shelf in the 6-foot high book shelves (in sight), but out of reach. To access a book, Ron had to communicate with his parents by requesting the book. He lead his parents by their hand to the book shelves and reached up with his hand toward the book. Leading and reaching were the most common topographies Ron used to request a book from the shelf.

In a typical book reading context, Ron was sitting facing his mother while she was reading the story. When his mother turned the page, looked at him, and waited. Ron would request "more reading" by reaching toward the book, vocalizing, leading his mother's hand to the book, or hitting (tapping) the book or his leg with his hand. All of these topographies had the same purpose, asking his mother to continue reading the story, and therefore constitute a response class. They are said to be functionally equivalent because each member produces the same outcome (i.e., mother continues to read the story). See Figure 2 for illustration of this response class.

The structured observations included one-on-one interactions with Ron and the researcher (the first author). During the structured interaction, the researcher followed a protocol that included embedding intentional breakdowns into the 10-20 minute sessions that averaged 30 request trials. Overall 26 structured sessions were conducted. To enhance the likelihood of requests, the researcher presented preferred toys and activities to Ron. When he made a request, she feigned a misunderstanding (i.e., she conveyed a communication breakdown by looking at Ron and saying, "What?") on average every third request. She honored every 2 of 3 requests immediately and feigned a breakdown on the third. This protocol was developed to retain ecological validity and to ensure a high proportion of success for

communication attempts. The data were analyzed by observing the videotapes and by coding Ron's request and repair topographies.

Natural observations

Figure 3 displays the repair topographies (the members of the response for requesting "more reading") Ron emitted under natural condition and their percentages.

During our natural observations, we conducted many informal conversations with Ron's mother and asked her about her responses to her son requests. Ron's mother said that as soon as he was labeled with an autism spectrum disorder, she began contacting people who had knowledge and experience with autism and gathered information on different interventions used with children with autism. Ron's mother was very involved in Ron's therapies and as she stated "I became my son's primary therapist."

In the first few months of natural observations, we asked Ron's mother why Ron hit the table or the book in the story reading situation (he did not often use this topography in other situations). She explained that she taught him to hit the table/book to make requests and required him to do so before she continued reading the story. Her behavior of reinforcing a specific topography, hitting the table, probably increased its efficiency and therefore could be one explanation for the relatively high percentage of hitting during the natural observations.

On January 24th, half way through the natural observations, Ron's mother adopted a new contingency: she wanted Ron to make requests by vocalizing so, during book reading, she continued reading only when he vocalized (with or without other topographies). To examine if Ron's mother's new contingency influenced Ron's repair topographies, we compared the percentages of hitting and vocalizing before and after January 24th. The findings are presented in Figure 4. It appears that the percentage of Ron's hitting to repair decreased from 82% to 48%, whereas his percentage of vocalization increased form 0% to 48%.

A defining feature of a response class is that a change in the probability of one member of the class affects the probability of other members in the class. In Ron's case, his mother decided that she wanted to increase his use of vocalizations and, therefore, honored his requests immediately and consistently when he vocalized. These changes in her behavior had a direct impact on two of the variables that determine the efficiency of a response (i.e., immediacy and consistency of reinforcement) and produced a corresponding change in Ron's repair topographies. We surmise that because both hitting and vocalizing belong to the same response class, when the probability of vocalizing increased, the probability of hitting decreased. It is noteworthy that although the level of hitting as a repair diminished after January 24th, it remained at almost 50%. Two possible explanations for this finding are (a) Ron's mother continued to reinforce hitting intermittently and (b) hitting and vocalizing occurred together, so both topographies were strengthened when they produced continued story reading.

Structured observations

During the structured observations, a few repeated breakdowns were scheduled. A repeated breakdown included more than one misunderstanding during a single interaction episode. For example if Ron vocalized to request that reading be continued, the researcher responded, "What?" and if Ron repaired by emitting another request topography, the researcher inserted another breakdown by saying "What?" Figure 5 displays the percentages of Ron's varying topographies across initial requests and repairs in response to repeated breakdowns.

The most notable finding across initial requests and repeated repairs is the inverse relationship (i.e., opposing trends) between pointing and vocalization. (Pointing was not observed during the natural

condition, but became one of Ron's functional request topography later in the study, during the structured observations). The percentage of pointing decreased from 56% to 19%, whereas the percentage of vocalization increased from 18% to 82%. In addition, the percentages of leading and reaching also increased from the initial request to the second repair. Overall, it appears that the probability of the more intrusive topographies (i.e., vocalization and leading) increased when Ron's request topography was misunderstood. Another notable finding not reflected in the data in Figure 5 is the appearance of a new topography for Ron. He cried during five of the repeated breakdown trials. Remember that repeated breakdowns are the equivalent of repeated extinction trials; thus, increased intensity and behavioral variability are to be expected. Although we did not gather formal data on intensity, we did observe anecdotally an increase in the intensity of vocalization and we noted a new topography: crying. Both of these topographies could be construed as problem behavior even though we had no formal definition for this type of behavior and were not recording it.

As mentioned above, researchers (Brady & Halle, 2002; Halle, et al., 2004; Keen, 2003; Wetherby et al., 1998) have suggested a relationship between communication breakdowns, repairs, and problem behavior. Keen (2003) presented two possible explanations for the occurrence of problem behavior in the context of communication breakdown. The first suggests that problem behavior is a form of protest or frustration after an attempt to communicate a need has failed. Scudder and Tremain (1992) found that children with mental retardation exhibited greater degrees of frustration as the request sequence progressed. One possible explanation for Ron's increased probability of vocalization and crying in response to repeated breakdowns was his increased level of frustration. According to Keen, a second possible explanation for the occurrence of challenging behavior in the context of breakdowns is that a problem behavior itself may be a type of repair strategy. For example, if Ron pointed to request an activity and his request was not honored, loud vocalization (screaming) may be a repair or a more emphatic form of requesting. Halle et al. (2004) argued that from a behavioral perspective that repairs occurring in response to breakdowns are parallel to the phenomenon of behavior undergoing extinction. If a 'new' repair topography spawned under extinction conditions is successful (e.g., the child obtains the desired item), the previously reinforced topography would weaken and the more problematic behavior would be strengthened. If the problem behavior is reinforced frequently, it might become not only a repair topography, but also an initial request topography.

Keen's (2003) two explanations for the etiology of problem behavior provide a framework for researchers and clinicians to consider. As behavior analysts, we find the two explanations difficult to disentangle. That is, how can one ever know whether it is frustration or prior history of reinforcement that determines a problem behavior? In a behavioral explanation, there is no need for the concept of frustration. Topographies that constitute behavioral variation, occurring as a result of extinction, are emitted and, if reinforced, are strengthened and may become prominent members of the response class. This operant analysis more closely resembles a continuum whereby new responses spawned by extinction are likely to be reinforced because of their attention-obtaining characteristics and then become salient members of the response class.

Summary

In this paper we have attempted to forge a relationship between two literatures by describing the concepts of communication breakdown and repair as discussed in the child language literature and by describing the concepts of response class, functional equivalence, and response efficiency as discussed in the operant literature. We believe these concepts refer to similar phenomena and have provided a case example to illustrate the similarities. Finally, by subjecting the data generated to an operant analysis, we developed potential hypotheses that might explain the findings observed. One of the advantages of the operant concepts is their heuristic value for explaining the behavior being examined. For example, the notion that negatively co-occurring response classes are organized in hierarchical fashion permits an

investigator to predict which member in a class is likely to be emitted in a particular context and, more important, provides direction for the design of interventions to modify the hierarchy, thereby influencing the probability of occurrence of equivalent members. This operant analysis of negatively co-occurring response classes has direct implications for problem behavior. If problem behavior is a member of a response class in which other functionally-equivalent members are more socially adaptive, then our task would be to enhance the efficiency of the socially adaptive members while simultaneously reducing the efficiency of the problem members.

References

Alexander, D. (1994). *The emergence of repair strategies in chronologically and developmentally young children*. Unpublished dissertation, Florida State University, Tallahassee.

Alexander, D., Wetherby, A., & Prizant, B. (1997). The emergence of repair strategies in infants and toddlers. *Seminars in Speech and Language, 18*(3), 197-212.

Baer, D. M. (1982). The imposition of structure on behavior and the demolition of behavior structures. In H. E. Howe (Ed.), *Nebraska symposium on motivation* (pp. 217-254). Lincoln, NE: University of Nebraska Press.

Brady, N. C., & Halle, J. W. (2002). Breakdowns and repairs in conversations between beginning AAC users and their partners. In J. Reichle, D.R. Beukelman, & J. C. Light (Eds.) *Exemplary practices for beginning communicators: Implications for AAC* (pp. 323-351). Baltimore, MD: Paul H. Brookes.

Brady, N. C., McLean, J. M., McLean, L. K., & Johnston, S. (1995). Initiation and repair of intentional communication acts by adults with severe to profound cognitive disabilities. *Journal of Speech and Hearing Research, 38,* 1334-1348.

Brinton, B., & Fujiki, M. (1991). Responses to requests for conversational repair by adults with mental retardation. *Journal of Speech and Hearing Research, 34*, 1087-1095.

Brinton, B., Fujiki, M., Winkler, E., & Loeb, D. (1986). Responses to requests for clarification in linguistically normal and language-impaired children. *Journal of Speech and Hearing Disorders, 51*, 370-378.

Carr, E. G. (1988). Functional equivalence as a mechanism of response generalization. In R. H. Horner, G. Dunlap, & R. L. Koegel (Eds.), *Generalization and maintenance: Life-style changes in applied settings* (pp. 221-241). Baltimore, MD: Paul H. Brookes Publishing Co.

Drasgow, E., Halle, J. W., & Phillips, B. (2001). Effects of different social partners on the discriminated requesting of a young child with autism and severe language delays. *Research in Developmental Disabilities, 22,* 125-139.

Gallagher, T. (1977). Revision behaviors in the speech of normal children developing language. *Journal of Speech and Hearing Research, 20,* 303-318.

Golinkoff, R. M. (1986). 'I beg your pardon?': The preverbal negotiation of failed messages. *Child Language, 13,* 455-476.

Halle, J., Brady, N. C., & Drasgow, E. (2004). Enhancing socially adaptive communicative repairs of

beginning communicators with disabilities. *American Journal of Speech-Language Pathology, 13,* 43-54.

Halle, J., Carey, Y., & Phillips, B. (December, 1999) *Examining communicative repairs in young children who lack language*. Paper presented at the International Conference of the Association for Persons with Severe Handicaps. Chicago, IL.

Halle, J. W., & Drasgow, E. (2003). Response class: Bear's contribution to understanding their structure and function. In K. S. Budd & T. Stokes (Eds.), *A small matter of proof: The legacy of Donald M. Bear* (pp. 113-124). Reno, NV: Context Press.

Horner, R. H., & Day, H. M. (1991). The effects of response efficiency on functionally equivalent competing behaviors. *Journal of Applied Behavior Analysis, 24*, 719-732.

Keen, D. (2003). Communication repair strategies and problem behaviours of children with autism. *International Journal of Disability, Development and Education, 50*(1), 53-64.

Mace, F. C., & Roberts, M. L. (1993). Factors affecting selection of behavioral interventions. In J. Reichle & D. P. Wacker (Eds.), *Communication alternatives to challenging behavior: Integrating functional assessment and intervention strategies* (pp. 113-133). Baltimore, MD: Paul H. Brookes Publishing Co.

Paul, R., & Cohen, D. (1984). Responses to contingent queries in adults with mental retardation and pervasive developmental disorders. *Applied Psycholinguistics, 5*, 349-357.

Reichle, J., & Johnston, S. S. (1999). Teaching the conditional use of communicative requests to two school-age children with severe developmental disabilities. *Language, Speech, and Hearing Services in School*, 30, 324-334.

Scudder, R. R., & Tremain, D. H. (1992). Repair behaviors of children with and without mental retardation. *Mental Retardation, 30*(5), 277-282.

Sigafoos, J., & Drasgow, E. (2001). Conditional use of aided and unaided AAC: A review and clinical case demonstration. *Focus on Autism and other Developmental Disabilities, 16*(3), 152-161.

Tomasello, M., Conti-Ramsden, G., & Ewert, B. (1990). Young children's conversations with their mothers and fathers: Differences in breakdown and repair. *Journal of Child Language, 17*, 115-130.

Tomasello, M., Farrar, M., & Dines, J. (1984). Children's speech revisions for a familiar and an unfamiliar adult. *Journal of Speech and Hearing Research, 27*, 359-363.

Wetherby, A. M., Alexander, D. G., & Prizant, B. M. (1998). The ontogeny and role of repair strategies. In A. M. Wetherby, S. F. Warren, & J. Reichle (Eds.), *Transition in prelinguistic communication* (pp. 135-161). Baltimore, MD: Paul H. Brookes Company.

Wetherby, A. M., & Prizant, B. M. (1993). *Communication and Symbolic Behavior Scale Manual*. Chicago: Applied Symbolix.

Wilcox, J. M., & Webster, E. J. (1980). Early discourse behavior: An analysis of children's responses to listener feedback. *Child Development, 51*, 1120-1125.

Zimmerman, I., Steiner, V., & Pond, R. (1992). *Preschool Language Scale -3*. Chicago: The Psychological Corporation.

Both authors may be reached at:
University of Illinois at Urbana-Champaign
Department of Special Education
College of Education
288 Education Building
1310 South Sixth Street
Champaign, IL 61820-6990
Phone: (217) 333-0260
Fax: (217) 333-6555
E-mail: meadanka@uiuc.edu and halle@uiuc.edu

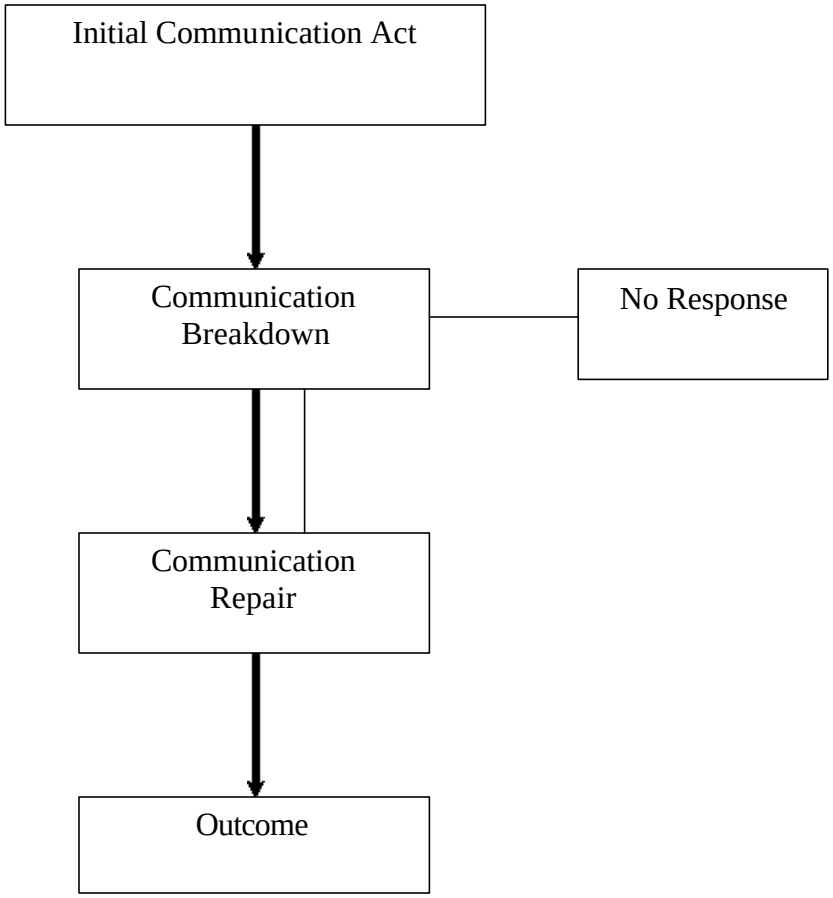
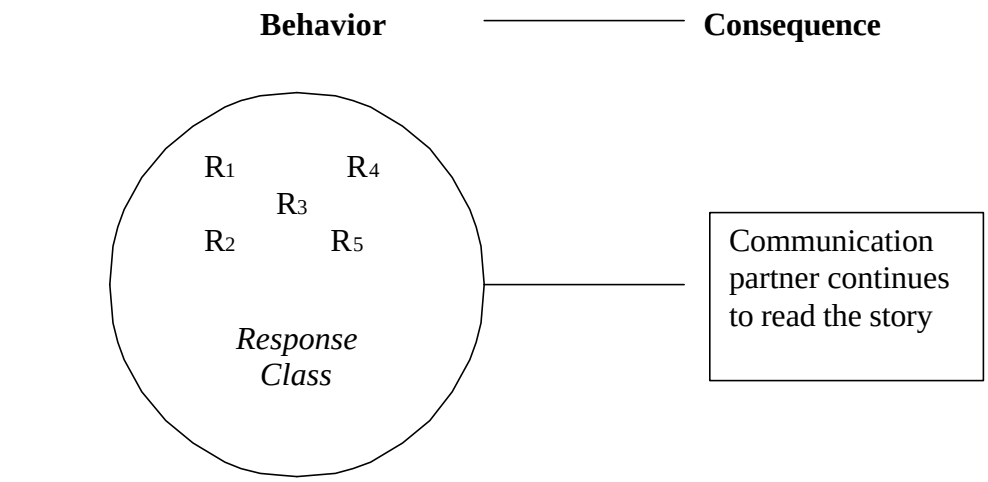


Figure 1. Flowchart of communication exchange



R_1= reach; R_2= point; R_3= vocalize; R_4= lead; R_5= hit

Figure 2. An illustration of a response class.

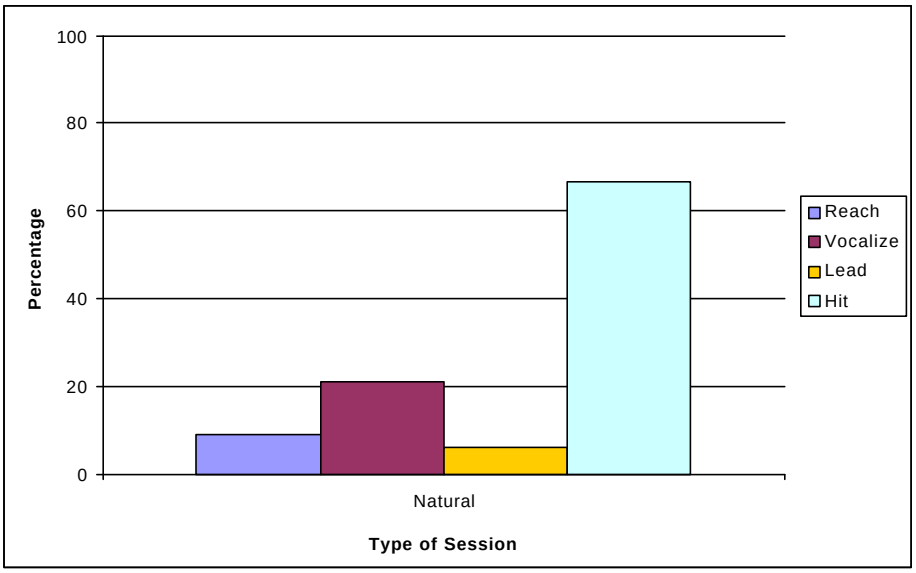


Figure 3. Topographies of repair during natural observations of book reading.

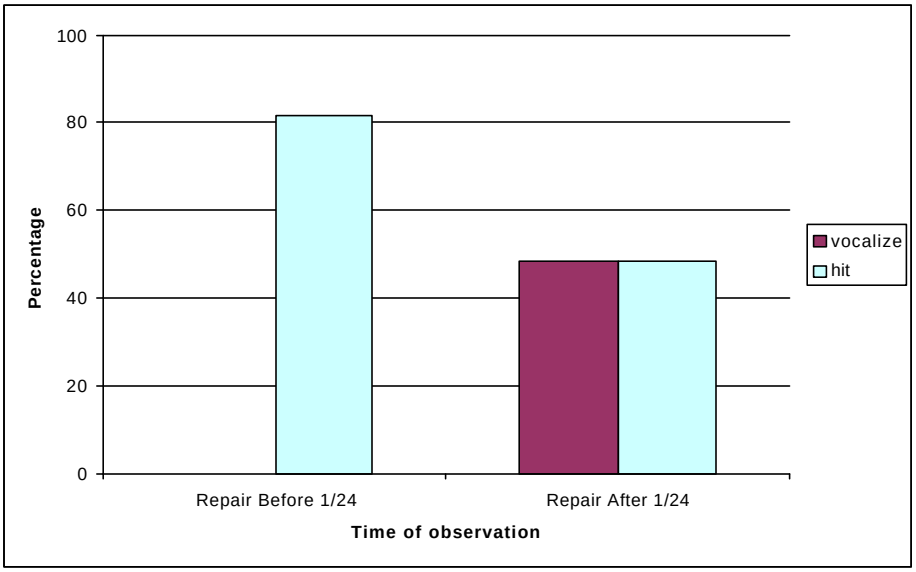


Figure 4. Topographies of repair during natural observations of book reading, before and after January 24th.

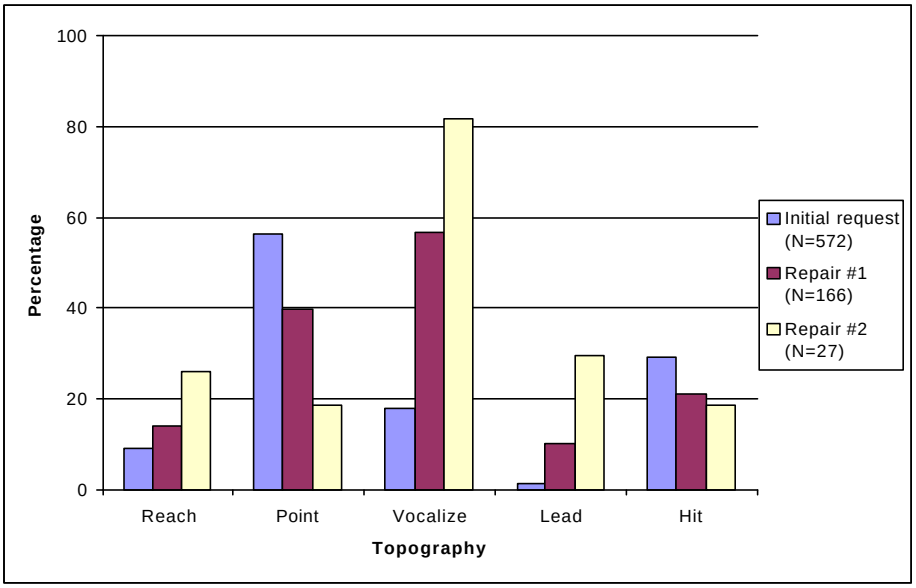


Figure 5. Topographies of request across initial requests and repeated breakdowns – structured observations.